CLAIMS

1) A method for groundmapping with a Synthetic Aperture Radar system comprising the steps of:

transmitting a series of stepped frequency chirped pulse pairs towards a terrain of interest; and

processing target echo return signals from the terrain of interest to develop a terrain map thereby.

2) A method, as defined in Claim 1, wherein said transmitting step comprises transmitting a series of first and second chirped pulse pairs wherein said second chirped pulse pair always has a frequency higher than the first pulse pair.

3) A method, as defined in Claim 2 wherein said transmitting step comprises transmitting a chirped pulse using $\Phi_m^T(t,n) = f_m t + \frac{\gamma}{2}(t-t_n)^2$, and wherein said processing step comprises processing $\Phi_m^R(t,n) = f_m(t-\tau_{t,m}) + \frac{\gamma}{2}(t-t_n-\tau_{t,m})^2$ as a received signal by dechirp processing which mixes the received signal with a reference signal composed of: $\Phi_m^{REF}(t,n) = f_m t + \frac{\gamma}{2}(t-t_n-\tau_{s,m})^{2^2}$ where

$\gamma$ equals a chip slope, $n$ equals a pulse index, and a reference point at step $m$ will be denoted by $\tau_{t,m}$ and $\tau_{s,m}$ where new time variable $\hat{t} = t - t_n$.

4) A method for groundmapping with a Synthetic Aperture Radar system comprising the steps of:

   transmitting a series of stepped frequency chirped pulse pairs toward a target of interest to generate target echo return signals in a data system;

   dechirping the target echo return signals in the data stream to produce pairs of sub-pulse range samples;

   combining pairs of sub-pulse range samples to produce a synthetic wide-band equivalent data stream; and

   performing terrain mapping on the wide-band equivalent data stream.

5) A method for groundmapping, as defined in Claim 4, wherein said transmitting step comprises transmitting a series of first and second chirped pulse pairs wherein said second chirped pulse in the pair always has a higher frequency than the first chirped pulse in the pair.

6) A method, as defined in Claim 5, wherein said transmitting step comprises transmitting a chirped pulse using $\Phi_m^T(t,m) = f_m t + \frac{\gamma}{2}(t - t_n)^2$, and wherein said dechirping step comprises processing

   $\Phi_m^R(t,n) = f_m(t - \tau_{t,m}) + \frac{\gamma}{2}(t - t_n - \tau_{t,m})^2$ on a received signal by dechirp processing which mixes the received signal with a reference signal composed of: $\Phi_m^{REF}(t,n) = f_m t + \frac{\gamma}{2}(t - t_n - \tau_{s,m})^{2^2}$ where $\gamma$ equals a chip slope, $n$ equals a

pulse index, and reference point at step $m$ will be denoted by $\tau_{t,m}$ and $\tau_{s,m}$ where new time variable $\hat{t} = t - t_n$.